## **CLAIMS**:

1. A phase shifter comprising;

a first power divider configured to receive a signal and provide plural quadrature components of the signal;

plural mixers coupled with the first power divider and configured to scale the quadrature components using a phase shift angle; and

- a second power divider coupled with the mixers and configured to combine the scaled quadrature components to shift the phase angle of the input signal by the phase shift angle.
- 2. The phase shifter according to claim 1 wherein the first power divider comprises a ninety degree power divider configured to provide the signal into a sine component and a cosine component.
- 3. The phase shifter according to claim 1 further comprising a storage device configured to store plural sine values and plural cosine values and to output a sine value and a cosine value individually corresponding to the phase shift angle.
- 4. The phase shifter according to claim 1 further comprising a storage device configured to store a sine value and a cosine value individually corresponding to the phase shift angle.

	5.	The	phas	e shifter	according	to	qlaim	1 4	whe	rein	the	m ixe r
are	couple	d wi	th th	e storag	ge device	and	ind	ividu	ally	cor	ıfigur	ed to
mul	tiply on	e of	the	quadratu	re compo	nenys	by	one	of	the	sine	value
and	the co	sine	value.									

- 6. The phase shifter according to claim 1 wherein the second power divider comprises a zero degree power divider configured to add the scaled quadrature components.
  - 7. A phase shifter comprising:
  - a first input configured to receive a signal having a phase angle;
  - a second input configured to receive a phase shift angle;
- a first power divider coupled with the first input and configured to provide the signal into a first component and a second component;
- a first mixer coupled with the first power divider and the second input and configured to scale the first component using the phase shift angle;
- a second mixer coupled with the first power divider and the second input and configured to scale the second component using the phase shift angle; and
- a second power divider coupled with the first mixer and the second mixer and configured to combine the first scaled component and the second scaled component to shift the phase angle of the input signal by the phase shift angle.

	8.	The	phase	shifter	accor	ding	to	claim	7	whe	rein	the	first
power	r divid	ler co	omprise	s a nii	nety d	legree	po	ower	divi	der	confi	gured	l to
provid	ie the	sign	al into	quadra	ture c	compo	nen	ts.					

- 9. The phase shifter according to claim 7 wherein the first power divider is configured to provide the signal into a sine component and a cosine component.
- a storage device coupled with the second input and being configured to store plural sine values and plural cosine values and output a sine value and a cosine value individually corresponding to the phase shift angle.
- 11. The phase shifter according to claim 7 further comprising a storage device configured to store a sine value and a cosine value individually corresponding to the phase shift angle.
- 12. The phase shifter according to claim 11 wherein the mixers are coupled with the storage device and individually configured to multiply one of the first and second components by one of the sine value and the cosine value.

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	13. The phase shifter according to claim 7
	power divider comprises a zero degree power divid
	the first scaled component and the second scaled
	An interrogator of a backscatter co
	comprising:
Į	a transmitter configured to output a local co
	and a radio frequency continuous wave signal; and
	a receiver configured to receive the local co
I	and a modulated radio frequency continuous wave
	including:
	a phase shifter configured to adjust a
	local continuous wave signal by a phase shift ang
	including a first power divider configured to provid

7 wherein the second er configured to add component.

ommunication system

- ntinuous wave signal
- ntinuous wave signal signal, the receiver
- phase angle of the le, the phase shifter de a first component and a second component of the local continuous wave signal, plural. mixers configured to scale the first component and the second component using the phase shift angle, and a second power divider configured to combine the scaled first component and the scaled second component to provide an adjusted continuous wave signal; and
- a coupler configured to combine the adjusted continuous wave signal and the modulated radio frequency continuous wave signal.

•	\\\\5.	The	ir	nterrogator	acco	rding	to	clain	ı Ni	wherein	the	firs
power	divi	der	is	configured	to	provi	de	the	signal	into	quadra	iture
compo	nents	3.										

The interrogator according to claim 14 wherein the first power divider comprises a ninety degree power divider configured to provide the signal into a sine component and a cosine component.

The interrogator according to claim of further comprising a storage device configured to store plural sine values and plural cosine values and output a sine value and a cosine value individually corresponding to the phase shift angle.

The interrogator according to claim 14 further comprising a storage device configured to store a sine value and a cosine value individually corresponding to the phase shift angle.

The interrogator according to claim 18 wherein the mixers are coupled with the storage device and individually configured to multiply one of the first and second components by one of the sine value and the cosine value.

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20. The interrogator according to claim 14 wherein the second power divider comprises a zero degree power divider configured to add the scaled first component and the scaled second component.

## 21. A phase shifter comprising:

- a first input configured to receive a signal having a phase angle;
- a second input configured to feceive a phase shift angle;
- a storage device configured to receive the phase shift angle, to store plural sine values and plural cosine values, and to output the sine value and cosine value which correspond to the phase shift angle;
- a ninety degree power divider coupled with the first input and configured to provide the signal into a sine component and a cosine component;
- a first mixer coupled with the hinety degree power divider and the storage device and configured to multiply the sine component of the signal by the sine value corresponding to the phase shift angle;
- a second mixer coupled with the ninety degree power divider and the storage device and configured to multiply the cosine component of the signal by the cosine value corresponding to the phase shift angle; and
- a zero degree power divider coupled with the first mixer and the second mixer and configured to add the sine component of the signal and the cosine component of the signal to shift the phase angle of the signal by the phase shift angle.

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1	22. A method of shifting a phase angle of a signal comprising:
2	providing a signal having a phase angle;
3	providing a phase shift angle;
4	providing the signal into a first component and a second
5	component;
6	scaling the first component using the phase shift angle;
7	scaling the second component using the phase shift angle;
8	combining the first component and the second component after the
9	scalings to shift the phase angle of the signal by the phase shift angle.
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11	23. The method according to claim 22 wherein the providing the
12	signal into a first component and a second component comprises
13	providing the signal into quadrature components.
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15	24. The method according to claim 22 wherein the providing the
16	signal into a first component and a second component comprises
17	providing the signal into a sine component and a cosine component.
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19	25. The method according to claim 22 further comprising:
20	storing a plurality of sine values and cosine values; and
21	outputting one sine value and one cosine value individually
22	corresponding to the phase shift angle.
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26. The method	according to claim 22 further comprising storing
a sine value and a cosin	ne value individually corresponding to the phase
shift angle.	
27. The method	according to claim 26 wherein the scalings
individually comprise m	ultiplying one of the first component and the
	ne of the sine value and the cosine value.
28. The method	according to claim 22 wherein the combining

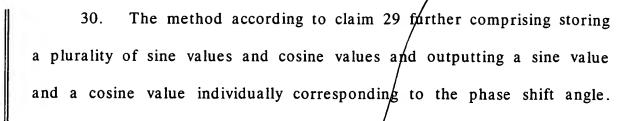
- 28. The method according to claim 22 wherein the combining comprises adding the scaled first component and the scaled second component.
  - 29. A method of shifting the phase angle of a signal comprising: providing a signal having a phase angle; providing a phase shift angle;

providing the signal into a sine component and a cosine component;

multiplying the sine component by a sine value corresponding to the phase shift angle;

multiplying the cosine component by a cosine value corresponding to the phase shift angle; and

adding the sine component and the cosine component after the multiplyings to shift the phase angle of the signal by the phase shift angle.



- 31. The method according to claim 29 wherein the providing the signal into a sine component and a cosine component comprises providing using a ninety degree power divider.
- 32. The method according to claim 29 wherein the multiplyings individually comprise multiplying using a mixer.
- 33. The method according to claim 29 wherein the combining comprises adding the scaled first component and the scaled second component.
- 34. The method according to claim 29 wherein the adding comprises adding using a zero degree power divider.

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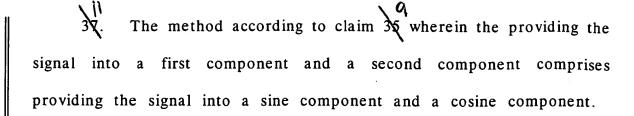
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method of operating a coherent interrogator of a backscatter communication system comprising: 2 outputting a radio frequency continuous wave signal; providing a local continuous wave signal; receiving a modulated continuous wave signal; 5 providing a phase shift angle; 6 adjusting the phase of the local continuous wave signal using the 7 phase shift angle to provide an adjusted continuous wave signal, the 8 adjusting including: providing the local continuous wave signal into a first 10 component and a second component; 11 scaling the first component using the phase shift angle; 12 scaling the second component using the phase shift angle; and combining the first component and the second component after the scalings to shift the phase angle of the local continuous wave signal by the phase shift angle; and combining the adjusted continuous wave signal and the modulated continuous wave signal. The method according to claim 35 wherein the providing the signal into a first component and a second component comprises

providing the signal into quadrature components.



The method according to claim 35 further comprising storing a plurality of sine values and cosine values and outputting a sine value and a cosine value individually corresponding to the phase shift angle.

39. The method according to claim 35 further comprising storing a sine value and a cosine value individually corresponding to the phase shift angle.

The method according to claim 32 wherein the scalings individually comprise multiplying one of the first component and the second component by one of the sine value and the cosine value.

41. The method according to claim 35 wherein the combining comprises adding the scaled first component and the scaled second component.

